

resolução SD EE1 - 2021.2

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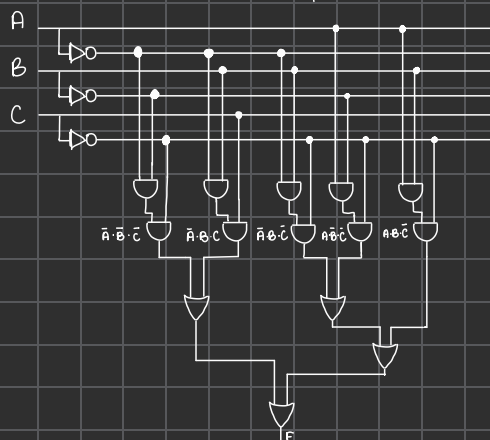
2021.2 - Sistemas Digitais - Abel Guilherme

1) $F = \bar{A} \cdot \bar{B} \cdot \bar{C} + \bar{A} \cdot B \cdot C + \bar{A} \cdot B \cdot \bar{C} + A \cdot \bar{B} \cdot \bar{C} + A \cdot B \cdot \bar{C}$

a) tabela verdade:

A	B	C	$\bar{A} \bar{B} \bar{C}$	$\bar{A} B C$	$\bar{A} B \bar{C}$	$A \bar{B} \bar{C}$	$A B \bar{C}$	F
0	0	0	1	0	0	0	0	1
0	0	1	0	0	0	0	0	0
0	1	0	0	0	1	0	0	1
0	1	1	0	1	0	0	0	1
1	0	0	0	0	0	1	0	1
1	0	1	0	0	0	0	0	0
1	1	0	0	0	0	0	1	1
1	1	1	0	0	0	0	0	0

circuito s/ otimizações



b)

AB \ C	00	01	11	10
0	1	1	1	1
1	0	1	0	0

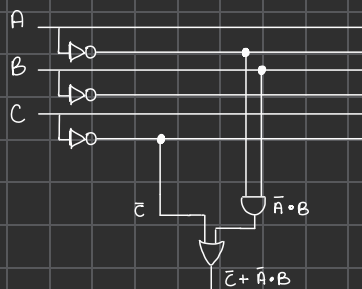
* \bar{C}
* $\bar{A} \cdot B$

Reduzido por Karnaugh:
 $\bar{C} + \bar{A} \cdot B$

tamanho:

a - 10 ends + 4 ors + 3 nots = $10 \cdot 10 + 4 \cdot 8 + 3 \cdot 3 = 141 \text{ mm}^2$

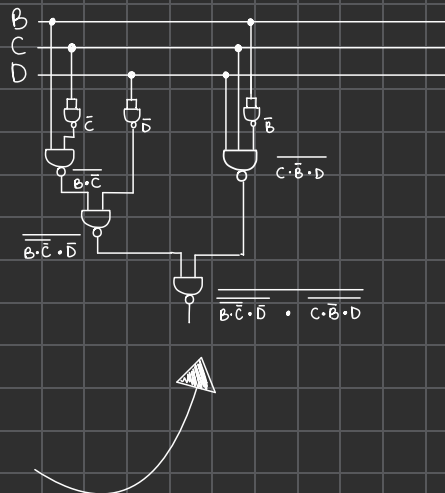
b - 1 end + 1 or + 3 nots = $10 + 8 + 3 \cdot 3 = 27 \text{ mm}^2$



2)

$$\begin{aligned}
 F &= (B \cdot C' + D) + ((C' + B) + D')' \\
 &\quad \text{De Morgan} \quad \text{Pois a resolver!} \quad \text{2 negações se cancelam! Porém, com elas, podemos aplicar De Morgan} \\
 &= (\overline{B \cdot C' + D}) + ((\overline{C' + B}) + \overline{D}) \\
 &\quad \text{De Morgan} \\
 &= (\overline{B \cdot C'} \cdot \overline{D}) + (\overline{C' \cdot B} + \overline{D}) \\
 &\quad \text{De Morgan} \\
 &= (\overline{B \cdot C'} \cdot \overline{D}) + (\overline{C \cdot B} + \overline{D}) \\
 &\quad \text{De Morgan} \\
 &= (\overline{B \cdot C'} \cdot \overline{D}) + (\overline{C \cdot B} \cdot \overline{D}) \\
 &\quad \text{Barra duas vezes + De Morgan} \\
 &= (\overline{B \cdot C' \cdot D}) + (\overline{C \cdot B \cdot D}) \\
 &= \overline{B \cdot C' \cdot D} \cdot \overline{C \cdot B \cdot D}
 \end{aligned}$$

Apenas nands! (Lembre que $\neg x = \overline{\overline{x}}$)
not = nand "curto-circuitado"

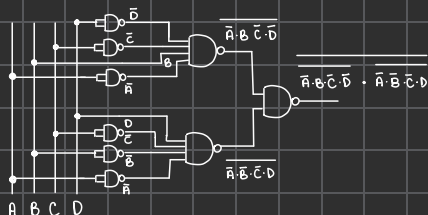


b) $G = m_1 + m_4$ - lembre-se que a lista dos m ... começa em $m_0 =$ tudo negado.

$m_1 = \bar{A} \cdot \bar{B} \cdot \bar{C} \cdot D$ # $m_4 = \bar{A} \cdot B \cdot \bar{C} \cdot \bar{D}$

$\bar{A} \cdot \bar{B} \cdot \bar{C} \cdot D + \bar{A} \cdot B \cdot \bar{C} \cdot \bar{D}$

$= \overline{\bar{A} \cdot \bar{B} \cdot \bar{C} \cdot D} + \overline{\bar{A} \cdot B \cdot \bar{C} \cdot \bar{D}} = \overline{\bar{A} \cdot \bar{B} \cdot \bar{C} \cdot D} \cdot \overline{\bar{A} \cdot B \cdot \bar{C} \cdot \bar{D}}$



3) tabela verdade

decimal	N_3	N_2	N_1	N_0	F	G
0	0	0	0	0	0	0
1	0	0	0	1	0	0
2	0	0	1	0	0	0
3	0	0	1	1	0	1
4	0	1	0	0	0	0
5	0	1	0	1	1	0
6	0	1	1	0	0	1
7	0	1	1	1	0	0
8	1	0	0	0	0	0
9	1	0	0	1	0	1
10	1	0	1	0	1	0
11	1	0	1	1	0	0
12	1	1	0	0	0	1
13	1	1	0	1	0	0
14	1	1	1	0	0	0
15	1	1	1	1	1	1

SAÍDA F: $\bar{N}_3 \bar{N}_2 \bar{N}_1 N_0 + \bar{N}_3 \bar{N}_2 N_1 \bar{N}_0 + \bar{N}_3 N_2 \bar{N}_1 N_0$

SAÍDA G: $\bar{N}_3 \bar{N}_2 N_1 N_0 + \bar{N}_3 N_2 N_1 \bar{N}_0 + N_3 \bar{N}_2 \bar{N}_1 N_0 + N_3 N_2 \bar{N}_1 \bar{N}_0 + N_3 N_2 N_1 N_0$

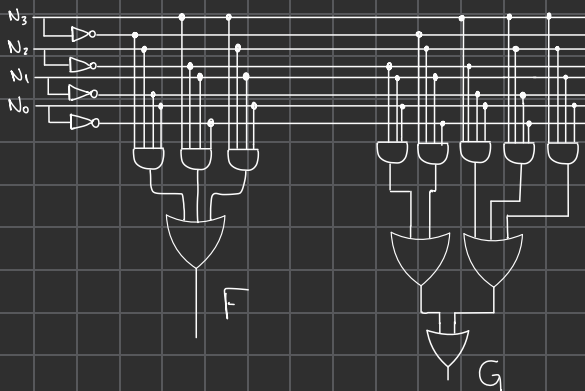
mapa-K F:

$N_3 N_2$	$N_1 N_0$	00	01	11	10
00	0	0	0	0	0
01	0	1	0	0	0
11	0	0	1	0	0
10	0	0	0	1	0

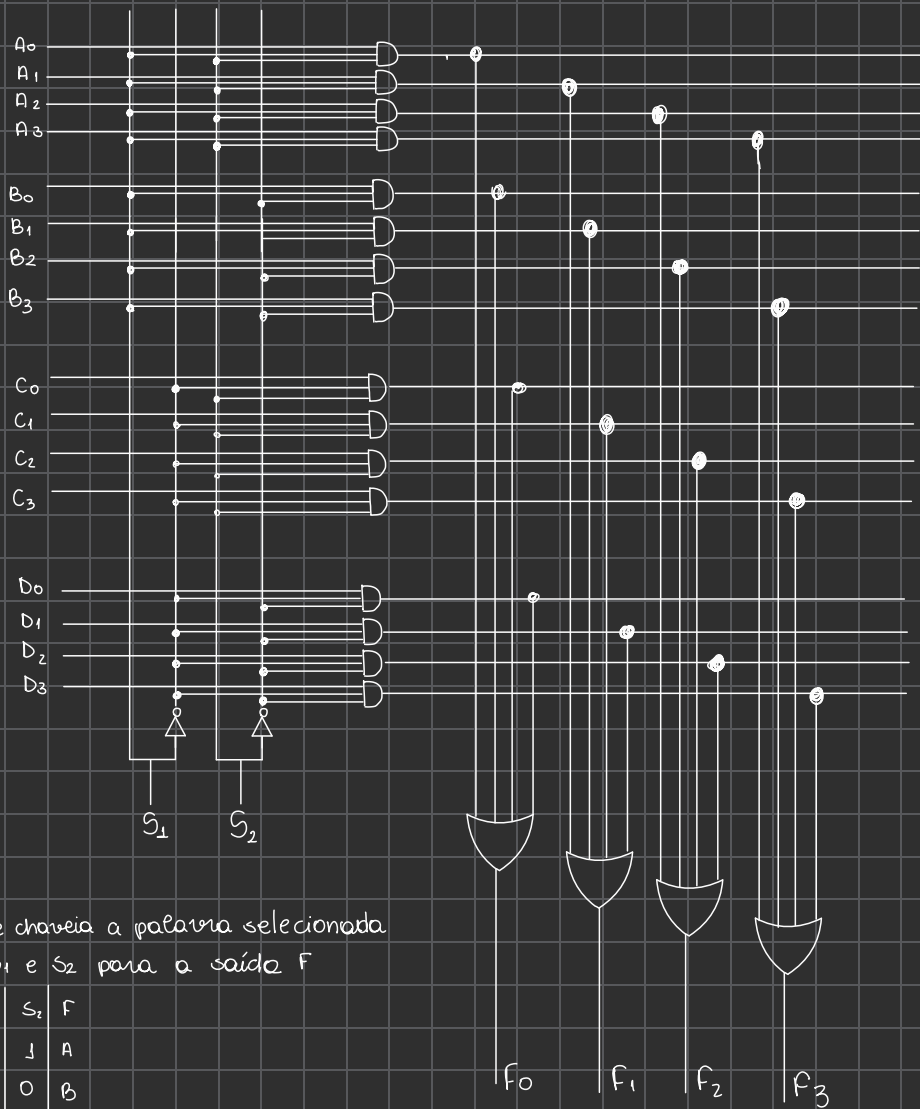
mapa-K G:

$N_3 N_2$	$N_1 N_0$	00	01	11	10
00	0	0	1	0	0
01	0	0	0	1	0
11	1	0	1	0	0
10	0	1	0	0	0

não são otimizáveis!



4)



Ele chaveia a palavra selecionada por S_1 e S_2 para a saída F

S_1	S_2	F
1	1	A
1	0	B
0	1	C
0	0	D